

where (Lyons et al., 1997). Combined data (presence of eggs in feces pretreatment and 48 hr PIT in addition to specimens passed in feces) indicate prevalence of 96% for *A. perfoliata* in the yearlings. This prevalence was much higher for *A. perfoliata* than found for specimens recovered from horses (50–60%) at necropsy in central Kentucky the last several years (Benton and Lyons, 1994). It is unknown whether Farm A is unique or sampling so many individuals in a closed system accounts for the high infection rate detected for *A. perfoliata*.

Interpretation of efficacy of the low dose level of pyrantel tartrate given once daily for 30 consecutive days on *A. perfoliata* is difficult based only on examination of feces for tapeworm eggs because false-negatives are common. However, the finding of specimens in feces of 74% of the yearlings over 2 days PIT and decline in presence of eggs in feces of both yearlings and mares, during and after treatment, indicate at least some drug activity. Also, these data seem to substantiate partially the good activity found by Greiner and Lane (1994). Further research,

such as controlled and critical tests, should be done to establish more definitive efficacy of the low dose rate of pyrantel tartrate on *A. perfoliata*.

Published as paper No. 96-14-105, in connection with a project of the Kentucky Agricultural Experiment Station, with the approval of the director.

Literature Cited

- Benton, E. R., and E. T. Lyons. 1994. Survey in central Kentucky for prevalence of *Anoplocephala perfoliata* in horses at necropsy in 1992. *Veterinary Parasitology* 55:81–86.
- Greiner, E. C., and T. J. Lane. 1994. Effects of the daily feeding of pyrantel tartrate on *Anoplocephala* infections in three horses: a pilot study. *Journal of Equine Veterinary Science* 14:43–44.
- Lyons, E. T., J. H., Drudge, S. C. Tolliver, and T. W. Swerczek. 1986. Pyrantel pamoate: evaluating activity against equine tapeworms. *Veterinary Medicine* 81:280–285.
- , S. C. Tolliver, K. J. McDowell, and J. H. Drudge. 1997. Atypical external characteristics of *Anoplocephala perfoliata* in equids in central Kentucky. *Journal of the Helminthological Society of Washington* 64:287–291.

J. Helminthol. Soc. Wash.
64(2), 1997 pp. 285–287

Research Note

Further Evaluation of Pyrantel Pamoate at the Therapeutic Dose Rate (6.6 mg base/kg) against *Anoplocephala perfoliata* in Horses

EUGENE T. LYONS,¹ SHARON C. TOLLIVER, AND J. HAROLD DRUDGE

Department of Veterinary Science, Gluck Equine Research Center, University of Kentucky, Lexington, Kentucky 40546-0099

ABSTRACT: Pyrantel pamoate paste was administered intraorally once at the therapeutic dose rate (6.6 mg base/kg) to 17 horses naturally infected with *Anoplocephala perfoliata*. Evaluation of drug activity by a modified critical test method indicated removals varying from 0 to 100% (aggregate average of 70%). Clearance was 0–27% ($n = 2$ horses), 36–44% ($n = 3$), 64–67% ($n = 2$), 75–88% ($n = 4$), 91–98% ($n = 3$), and 100% ($n = 3$).

KEY WORDS: *Anoplocephala perfoliata*, horses, ef-

ficacy, pyrantel pamoate paste, therapeutic dose rate, modified critical test.

Anoplocephala perfoliata is commonly found in equids and may cause health problems (Lyons et al., 1986; Benton and Lyons, 1994). Pyrantel pamoate, commercially available as a nematocide, has been reported as active on *A. perfoliata* at the therapeutic dose rate (6.6 mg base/kg) (aggregate average removal = 88%) and 13.2 mg base/kg dose rate (aggregate average removal = 93%); however, activity was quite variable for

¹ Corresponding author (e-mail: elyons1@pop.uky.edu).

both dose rates (Lyons et al., 1986, 1989). Limited early research on pyrantel pamoate showed that the 2× dose rate was much more effective than the 1× dose rate on *A. perfoliata* (Slocombe, 1979).

The purpose of the present research was to obtain additional data on activity of the therapeutic dose rate (6.6 mg base/kg) of pyrantel pamoate paste (Strongid® Paste, Pfizer, New York) on natural infections of *A. perfoliata* in horses. The drug was administered once intraorally between 5 November 1992 and 3 July 1996 to 28 horses, but only 17 were infected with specimens of *A. perfoliata*. The 17 infected, treated horses included 13 Thoroughbreds, 2 Thoroughbred crossbreeds, 1 Arabian, and 1 Quarter Horse. Their ages were weanling ($n = 2$), 1 yr ($n = 7$), 2 yr ($n = 5$), 5 yr ($n = 1$), 10 yr ($n = 1$), and 18 yr ($n = 1$); sexes were 8 females, 6 males (intact), and 3 geldings.

A modified critical test was used to evaluate efficacy of the drug and details have been published (Todd and Brown, 1952; Lyons et al., 1986, 1989). A brief description of the modified critical is as follows: At necropsy, usually at 24 hr posttreatment, *A. perfoliata* found in the small intestine and cecum, in addition to those attached to the mucosa of the ventral colon, are considered remaining or not removed by a drug. However, specimens recovered from contents of the ventral colon, dorsal colon, small colon, and rectum are regarded as removed by a drug. The basis for the modified critical test is that *A. perfoliata* normally inhabit the cecum but occasionally are found in the small intestine and ventral colon. By 24 hr posttreatment, tapeworms affected by a drug, such as pyrantel pamoate, generally will have passed posteriorly from their normal location in the intestine, but probably few have been eliminated in the feces.

For 13 of the 17 infected horses, a 24-hr critical test was done, for which feces passed posttreatment were not examined for tapeworm specimens (Lyons et al., 1986). With the other 4 infected horses, feces were collected and examined for *A. perfoliata* specimens for 48 hr posttreatment.

Results are given in Table 1. Aggregate average removal was 70% with variation of individual efficacies between 0 and 100%. Grouping of the data for the horses indicates removals were $\geq 91\%$ for 6, 75–88% for 4, and 67% for the other 7. For the 4 horses for which feces

Table 1. Data for *Anoplocephala perfoliata* recovered from 17 horses treated with pyrantel pamoate paste intraorally at the therapeutic dose rate (6.6 mg base/kg) in modified critical tests.*

Horse No.	<i>Anoplocephala perfoliata</i>			Percent removal
	No. removed†	No. remaining‡	Total No.	
1	9	3	12	75
2	10	1	11	91
3	37	65	102	36
4	16	3	19	84
5	17	46	63	27
6	289	19	308	94
7	232	301	533	44
8	9	5	14	64
9	3	4	7	43
10	171	23	194	88
11	9	0	9	100
12	16	5	21	76
13	316	155	471	67
14	1	0	1	100
15	60	1	61	98
16	2	0	2	100
17	0	1	1	0

* Thirteen horses were killed at 24 hr posttreatment; for the other 4 horses (Nos. 13, 14, 16, and 17), feces were examined for tapeworms for 48 hr posttreatment, at which time these horses were killed.

† Removed = specimens recovered from contents of the ventral colon, dorsal colon, small colon, and rectum at necropsy; also includes specimens passed in feces of the 4 horses killed at 48 hr posttreatment.

‡ Remaining = specimens recovered from the small intestine and cecum, in addition to those attached to the mucosa of the ventral colon at necropsy.

were examined for 48 hr posttreatment, individual efficacies were 0, 67, 100, and 100%. The aggregate average efficacy (70%) of pyrantel pamoate at the dose rate of 6.6 mg base/kg in the present study was 18% less than that (88%) previously found for the paste formulation, but it was similar to that (75%) recorded for the suspension formulation (Lyons et al., 1989). Findings in this research, while efficacies were greatly variable, substantiate the potential beneficial activity of the therapeutic dose rate (6.6 mg base/kg) of pyrantel pamoate on *A. perfoliata* in equids.

Prevalence of *A. perfoliata* was 61% in the 28 test horses; 24 were Thoroughbreds, for which prevalence was 54%, and if the 2 Thoroughbred crossbreeds are also included as Thoroughbreds it was 58% for this breed. These prevalence values are similar to those found the last several years for horses, most data are for Thorough-

breeds, in central Kentucky from which *A. perfoliata* specimens were recovered at necropsy (Benton and Lyons, 1994).

This note was published as paper No. 96-14-134 in connection with a project of the Kentucky Agricultural Experiment Station, with the approval of the director.

Literature Cited

- Benton, R. E., and E. T. Lyons. 1994. Survey in central Kentucky for prevalence of *Anoplocephala perfoliata* in horses at necropsy in 1992. *Veterinary Parasitology* 55:81–86.
- Lyons, E. T., J. H. Drudge, and S. C. Tolliver. 1986. Pyrantel pamoate: evaluating its activity against equine tapeworms. *Veterinary Medicine* 81:280–285.
- _____, _____, T. W. Swerczek, and S. S. Collins. 1989. Determination of the efficacy of pyrantel pamoate at the therapeutic dose rate against the tapeworm *Anoplocephala perfoliata* in equids using a modification of the critical test method. *Veterinary Parasitology* 31:13–18.
- Slocombe, J. O. D. 1979. Prevalence and treatment of tapeworms in horses. *Canadian Veterinary Journal* 20:136–140.
- Todd, A. C. and T. C. Brown. 1952. Critical tests with toluene for ascarids and bots in horses. *American Journal of Veterinary Research* 13:198–200.
- J. Helminthol. Soc. Wash.
64(2), 1997 pp. 287–291

Research Note

Atypical External Characteristics of *Anoplocephala perfoliata* in Equids in Central Kentucky

EUGENE T. LYONS, SHARON C. TOLLIVER, KAREN J. MCDOWELL,
AND J. HAROLD DRUDGE

Department of Veterinary Science, Gluck Equine Research Center, University of Kentucky,
Lexington, Kentucky 40546-0099

ABSTRACT: As part of a study evaluating efficacy of pyrantel tartrate fed at the low dose rate (2.64 mg/kg) once daily for 30 consecutive days against *Anoplocephala perfoliata* in Thoroughbreds on Farm A in central Kentucky, about two-thirds of the feces passed by yearlings ($n = 58$) for 2 days postinitial treatment day was examined for specimens of this parasite. Efficacy data are given elsewhere (Lyons, et al., 1997), and observations on external characteristics of *A. perfoliata* specimens recovered from feces are presented here. Of a total of 401 *A. perfoliata* specimens with scolices found in feces of 43 of the yearlings, external features were typical (normal strobila and scolex with 4 suckers/4 lappets) for 97.5% ($n = 391$ specimens). However, 2.5% ($n = 10$) were atypical: (a) 1 had a normal strobila but a scolex with 6 suckers/4 lappets, (b) 7 had a triradiate strobila and a scolex with either 5 suckers/6 lappets ($n = 1$) or 6 suckers/6 lappets ($n = 6$), and (c) 2 had a tetra-radiate strobila and a scolex with either 7 suckers/7 lappets or 8 suckers/8 lappets. Reexamination of 22,557 specimens of *A. perfoliata* from equids in previous investigations at the University of Kentucky, for comparison of external

characteristics in specimens from Farm A horses, revealed 99.95% ($n = 22,545$) were typical and 0.05% ($n = 12$) were atypical (all had a triradiate strobila and a scolex with 6 suckers/6 lappets).

KEY WORDS: *Anoplocephala perfoliata*, cestode, equids, atypical, external characteristics, polyradiate, scolex abnormalities.

A field test was done on Thoroughbred mares ($n = 83$) and yearlings ($n = 58$) on Farm A in central Kentucky to evaluate activity against *Anoplocephala perfoliata* for pyrantel tartrate (Strongid® C, Pfizer, New York) fed at the low dose rate (2.64 mg/kg) once daily for 30 consecutive days (Lyons et al., 1997). About two-thirds of the feces passed by the yearlings for 2 days postinitial treatment day was examined for specimens of *A. perfoliata*: (a) for evaluation of activity of the drug and (b) to more clearly establish prevalence of this parasite in horses on Farm A (Lyons et al., 1997).

The purposes of the present paper are to relate findings on external features of *A. perfoliata* recovered from Farm A yearlings and the com-

¹ Corresponding author (e-mail:elyons1@pop.uky.edu).